**Disinfection Plan**

 **Newly Constructed Potable Water Mains**

**Continuous Feed Method**

**Austin Water**

**Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Project Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**SP # or CIP ID: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Engineering Firm: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Engineer of Record: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Contractor: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Disinfection Contractor: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**City of Austin Inspector: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Prepared by with email: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Preparer’s Telephone: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Estimated date of flushing: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**All High Density Polyethylene (HDPE) pipe shall only be disinfected by the continuous feed method. The liquid disinfection chemical solution should be limited to less than 12% active chlorine. The time-duration of the disinfection should not exceed 24 hours.**

**If the total length of the connection from the end of the new main to the existing main is equal to or less than 20 ft, as an optional procedure, the new pipe, fittings, and valve(s) required for the connection may be spray-disinfected or swabbed with a minimum 1 percent solution of chlorine just prior to being installed. You will not need to fill out this form.**

**Project Description** (LF, pipe diameter, pipe capacity)

\_\_\_\_\_\_\_LF \_\_\_\_ Inch Waterline Capacity \_\_\_\_\_\_\_\_\_\_\_gallons

\_\_\_\_\_\_\_LF \_\_\_\_ Inch Waterline Capacity \_\_\_\_\_\_\_\_\_\_\_gallons

\_\_\_\_\_\_\_LF \_\_\_\_ Inch Waterline Capacity \_\_\_\_\_\_\_\_\_\_\_gallons

\_\_\_\_\_\_\_LF \_\_\_\_ Inch Waterline Capacity \_\_\_\_\_\_\_\_\_\_\_gallons

\_\_\_\_\_\_\_LF \_\_\_\_ Inch Waterline Capacity \_\_\_\_\_\_\_\_\_\_\_gallons

\_\_\_\_\_\_\_LF \_\_\_\_ Inch Waterline Capacity \_\_\_\_\_\_\_\_\_\_\_gallons

\_\_\_\_\_\_\_LF \_\_\_\_ Inch Waterline Capacity \_\_\_\_\_\_\_\_\_\_\_gallons

\_\_\_\_\_\_\_LF \_\_\_\_ Inch Waterline Capacity \_\_\_\_\_\_\_\_\_\_\_gallons

\_\_\_\_\_\_\_LF \_\_\_\_ Inch Waterline Capacity \_\_\_\_\_\_\_\_\_\_\_gallons

Example for 1000 LF of 12” WL (1000/100) x 587(from Table 2, pg 9) = 5870 gallons

(Auxiliary lines equal to or less than 30’ in length are not required to be listed on this page)

**Section 1. Preparation**

**Section 1.A. Preventative and Corrective Measures during Construction**

Proper precautions shall be taken to assure the pipe remains clean and dry during construction including but not limited to those preventative and corrective measures indicated in section 4.8 of AWWA C651-14.

**Section 1.B. Measurement of Water used in Disinfection Process**

All water used in the process shall be measured. Measurement shall be accomplished by filling out the attached “Volume of Water used for Flushing” spreadsheet. Payment for water use will not be required by the construction contractor.

**Section 1.C. Water Supply**

**Water shall be supplied through (Only 1 connection of the new waterline system to the existing main is allowed. Submit one plan per connection to main):**

**\_\_\_\_\_\_\_One Connection of new main to existing main at Station \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

(Valve isolating new main from existing potable water system shall be tagged to prevent unintentional release of the elevated chlorine residual to the system.)

**OR**

**\_\_\_\_\_\_\_Temporary flushing/testing connection** by connecting temporary plug on new main at no more than 20’ from the proposed tie-in point to the existing main at Sta \_\_\_\_\_\_\_ to existing FH # \_\_\_\_\_\_\_\_\_\_\_\_ equipped with cross connection control device.

**Section 2. Discharge**

Discharge shall be within 20 feet of end of new main at the following location(s)

\_\_\_\_\_\_\_\_Existing or new fire hydrant Sta \_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_Existing or new Service Sta \_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_Temporary combination blowoff and sampling tap at Sta \_\_\_\_\_\_\_\_\_

**Section 3. Pre- Flushing of Source Water**

The source of potable water used for disinfection and pressure testing shall be flushed prior to its use to ensure that contaminants or debris are not introduced into the new pipe.

**Section 4. Preliminary Flushing**

Preliminary flushing shall be performed after installation and before disinfection to remove particulates. The flushing velocity shall be no less than 3.0 fps. We recommend using a meter to determine the flow rate. We allow the flushed water volume to be up to 3 times the capacity of the water main. Calculations may be rounded off.

Flow rate to achieve 3.0 fps \_\_\_\_\_\_\_\_\_\_\_ gpm

Capacity of new water mains \_\_\_\_\_\_\_\_\_\_\_\_\_ gallons

Est. Water Volume to be flushed \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ gallon

Estimated time for preliminary flushing \_\_\_\_\_\_\_\_\_\_\_\_\_ minutes

**Section 5. Hydrostatic Testing**

Hydrostatic testing shall be performed prior to disinfecting the main.

**Section 6. Continuous Feed Disinfection**

**Section 6.A. Chlorine**

Amounts of chemicals required to neutralize various residual chlorine concentrations in 100,000 gallons of water. User should confirm required dosage with chemical supplier.

 Calcium Hypochlorite

 Sodium Hypochlorite Required Required

Desired Chlorine Liquid 5% 10% 12.5% 15% 65%

Concentration Chlorine Available Available Available Available Available

In Water Required Chlorine Chlorine Chlorine Chlorine Chlorine

mg/L lb gal gal gal gal lb

 2 1.7 3.9 2.0 1.3 2.6

10 8.3 19.4 9.9 6.7 12.8

25 21.0 48.5 24.8 18.8 16.7 32.0

50 42.0 97.0 49.6 33.4 64.0

Sodium hypochlorite or calcium hypochlorite solution conforming to ANSI/AWWA B300 and NSF 60 containing approximately 5 to 15 percent available chlorine. Calcium Hypochlorite is not allowed for HDPE mains.

**Type of Chemical to be used \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Available chlorine by volume \_\_\_\_\_\_\_\_\_\_\_\_\_ %**

**Manufacturer \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (provide MSDS)**

**Pipe Capacity \_\_\_\_\_\_\_\_\_ gal**

**Quantity of Chlorine feed \_\_\_\_\_\_\_\_\_ gal or lb**

Example for Calcium Hypochlorite at 25 mg/L for 1000 gallons (1000 / 100,000) x 32

**Section 6.B. Chlorine Injection**

A chlorine injection point shall be located not more than 10 feet downstream of the temporary flushing connection. Calculations may be rounded off.

Chlorine Injection point shall be through

**\_\_\_\_\_\_\_ Temporary Injection point installed at Sta \_\_\_\_\_\_\_\_\_\_\_**

**OR**

**\_\_\_\_\_\_\_ New Water Service at Sta \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Water entering the new main shall receive a dose of chlorine fed at a constant rate such that the water will have not less than 25 mg/L (ppm) of free chlorine. Chlorine shall be measured at regular intervals in accordance with the procedures described in the current edition of *Standard Methods for the Examination of Water and Wastewater* or AWWA Manual M12, or using appropriate chlorine test kits. Appropriate methods include DPD Drop Dilution Method or High-Range Chlorine Test Kits. Chlorine application shall not cease until the entire main is filled with heavily chlorinated water. (min 25 mg/L). If multiple discharge locations are being used, please provide a sequence of chlorination and dechlorination that describes when valves and end of line locations will be opened and closed so that all pipe sections received the required amount of chlorine.

**Sequence (if applicable)**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Section 6.C. Disinfection of Appurtenances**

Disinfection of appurtenancesshall occur while new main is heavily chlorinated by operating all valves, hydrants, and service connections to ensure contact with the chlorinated water.

**Appurtenances**

**Sta Description Operated (Check when operated)**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Section 6.D. Hold superchlorinated water**

Hold superchlorinated waterin the main for a minimum of 24 hours. At the end of 24 hours, the treated water in all portions of the main shall have a residual of not less than 10 mg/L (ppm) of free chlorine.

**Section 7. Final Flushing**

After the applicable retention period, heavily chlorinated water should not remain in prolonged contact with pipe. Chlorinated water shall be flushed from the main, fittings, valves, and branches until chlorine measurements show that the concentration in the water leaving the main is no higher than that generally prevailing in the distribution system or that is acceptable for domestic use. (Typically 0.50 – 2.0 mg/L) A minimum of one times the volume of water in the new pipe shall be flushed. Recommended flushing velocity is 3.0 fps minimum. We recommend using a meter to determine the flow rate. We allow the flushed water volume to be up to 3 times the capacity of the water main. AW allows the anticipated amount for final flushing to be 2 volumes of water. Calculations may be rounded off.

**Flow rate for final flushing = \_\_\_\_\_\_\_\_\_\_\_\_\_\_ gpm \_\_\_\_\_\_\_\_\_\_\_\_\_ fps**

**Amount of discharge water anticipated for final flushing = \_\_\_\_\_\_\_\_\_\_\_gallons**

**Estimated time for final flushing = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ minutes**

**Section 8. Dechlorinating and Disposing of Chlorinated Water**

Allheavily chlorinatedwater discharged during this procedure shall be dechlorinated and disposed of properly.

**Section 8.A. Dechlorination Chemical**

Dechlorination chemicals of food grade quality shall be used to dechlorinate all water discharged from the system adequately to result in no detectable chlorine residual when measured by an appropriate low level chlorine test kit before the water reaches the curb inlet, wastewater manhole, or receiving streams or wetlands.

Amounts of chemicals required to neutralize various residual chlorine concentrations in 100,000 gallons of water. Table below from AWWA C655-09 – User should confirm required dosage with chemical supplier. Water leaving the new main shall receive a dose of the dechlorination chemical fed at a constant rate assuming the line will have 25 mg/L (ppm) of residual chlorine concentration. The residual chlorine concentration in the water leaving the main shall be measured at regular intervals using appropriate chlorine test kits to insure it does not exceed 1 mg/L.

Residual Calcium Sodium Ascorbic Sodium Sodium

Chlorine Thiosulfate Thiosulfate Acid Bisulfite Sulfite

Concentration (CaS2O3) (Na2S2O3-5H20) (C6O8H6) (NaHSO3) (Na2SO3)

Mg/L gal lb lb lb lb

1 0.34 1.2 2.1 1.2 1.4

2 0.67 2.4 4.2 2.5 2.9

10 3.36 12.0 20.9 12.5 14.6

25 8.4 30.0 52.0 31.3 36.5

50 16.8 60.0 104.0 62.6 73.0

**Chlorine Concentration prior to Dechlor \_\_\_\_\_\_\_\_\_\_ mg/L**

**Pipe Capacity \_\_\_\_\_\_\_\_\_\_\_\_ gallons**

**Type of Chemical \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Brand/Manufacturer \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (submit MSDS)**

**Chemical quantity required \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ lb**

Example for Calcium Thiosulfate for 1000 gallons (1000 / 100,000) x 8.4

Calculations may be rounded off.

S**ection 8. B. Discharge/Disposal**

Optional discharge methods are indicated below in order of preference:

* + Beneficial reuse – Discharge to a water truck and used for beneficial use such as irrigation, watering for dust control, or other acceptable beneficial construction use. MAY NOT be used as potable water for consumption.
	+ Storm Sewer/Retention Pond – May be transported by hose to storm sewer inlet which discharges to a retention pond or holding pond approved AWU. An air gap shall be maintained between the discharge end of the hose and the inlet.
	+ Wastewater Manhole – May be transported by hose to wastewater manhole subject to approval of Austin Water Utility. An air gap must be maintained between the discharge end of the hose and the manhole.

**---AIR GAP REQUIRED AT DISCHARGE POINT FOR ALL METHODS**.-----

(Contractor shall check selected method.)

\_\_\_\_\_\_\_ Beneficial reuse - Dechlorinated water shall be loaded into a water truck and conveyed to (describe location(s)) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ for (describe use) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 \_\_\_\_\_\_\_\_\_ Storm sewer disposal - Dechlorinated water shall be transported from discharge point to storm sewer inlet via fire hose or ground, if it slopes to the storm sewer inlet.

For support with runoff issues, contact the 24-hour Pollution Hotline at 974-2550.

\_\_\_\_\_\_\_ Sanitary Sewer disposal. Dechlorinated water shall be transported from discharge point to sanitary sewer manhole via fire hose.

**Section 9. Bacteriological Tests**

After disinfection and final flushing such that typical system chlorine residuals are present, if the system operates with a residual, samples shall be collected per one of the two options. Option A: Before approving a main for release, take an initial set of samples and resample again after a minimum of 16 hours using the sampling site procedures outlined. Both sets of samples must pass for the main to be approved for release. Option B: Before approving a main for release, let it sit for a minimum of 16 hours without any water use. Then collect, using the sampling site procedures outlined and without flushing the main, two sets of samples a minimum of 15 minutes apart while the sampling taps are left running. Both sets of samples must pass for the main to be approved for release.

* **Sample Locations**. As a minimum, at least one set of samples shall be taken from the end of the line(s), from each branch greater than one pipe length, and at intervals not to exceed 1200 feet of the new main. If there is reason to believe that trench water has entered the new main during construction or if, in the opinion of the purchaser, excessive quantities of dirt or debris have entered the main, the AWU representative may require samples be taken at intervals of approximately 200 feet.

Sample Locations (List by Station and Description)

(WS: *Water* *Service* FH: *Fire Hydrant* TFV: *Temporary Flush Valve*)

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* **Procedure** - No hose shall be used in the collection of samples. Use of a combination blowoff and sampling tap is recommended. Samples shall be collected by City of Austin personnel in sterile bottles treated with sodium thiosulfate.
* **Sample results –** If initial samples produce acceptable laboratory results, a second set of samples will be taken 16 hours after the first sample. CAUTION: NO flushing shall be allowed between sampling except as needed to flush the sampling port. If sample results from the lab indicate a measured HPC greater than 500 colony-forming units (cfu) per mL, flushing shall be resumed and another set up samples should be taken until no coliforms are present.
* **Redisinfection –** If two successive passing samples cannot be achieved, the new main may be reflushed and shall be resampled. If these samples also fail to produce acceptable results, the main shall be rechlorinated by continuous feed method until satisfactory results are obtained – that being acceptable samples taken as described in Section 9.

**Date/Time 1st Samples Collected \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Pass/Fail**

**Date/Time 2nd Sample Collected \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Pass/Fail**

**Section 10. Removal of Temporary Connections**

After satisfactory bacteriological sample results have been received, all temporary connections installed for this procedure (temporary connections, temporary injection point, temporary flushing devices) must be appropriately cut and plugged at the water main.

**Section 11. Final Connection to Existing Mains**

After satisfactory bacteriological sample results have been received, permanent connections may be made to the active distribution system. Sanitary construction practices must be followed during installation of the final connection to prohibit contamination of the new or existing water main.

**Section 11.A. Connection of pipe length less than or equal to 20 feet**

New pipe, fittings, and valves required for the connection must be spray-disinfected or swabbed with a minimum of 1 percent solution of chlorine just prior to being installed.

**Section 11.B. Connection of pipe greater than 20 feet**

Pipe required for the connection must be set up above ground, disinfected, and bacteriological samples taken as described in Section 8. After satisfactory bacteriological sample results have been received, the pipe can be used in connecting the new main to the active distribution system. Between the time satisfactory sample results have been received and the time that the connection piping is installed, the ends of the pipe must be sealed with plastic wraps, watertight plugs, or caps.

**Appendix**

**Table 1: Velocity (fps) Conversion to Flow Rate (gpm)(Q=VA)**

|  |  |  |
| --- | --- | --- |
| Pipe size (in) | Velocity (fps) | Q (gpm) |
| 1.5 | 1 | 6 |
| 1.5 | 3 | 17 |
| 2 | 1 | 10 |
| 2 | 3 | 29 |
| 4 | 1 | 39 |
| 4 | 3 | 118 |
| 6 | 1 | 88 |
| 6 | 3 | 264 |
| 8 | 1 | 157 |
| 8 | 3 | 470 |
| 10 | 1 | 245 |
| 10 | 3 | 734 |
| 12 | 1 | 352 |
| 12 | 3 | 1058 |
| 16 | 1 | 627 |
| 16 | 3 | 1880 |
| 24 | 1 | 1410 |
| 24 | 3 | 4230 |

**Table 2: Pipe Capacity (gallons)**

|  |  |  |  |
| --- | --- | --- | --- |
| Pipe Dia | Area | Volume Per 100 LF | Capacity Per 100 lf |
| (in) | (sf) | (cf) | (gallons) |
| 1.5 | 0.012272 | 1.23 | 9 |
| 2 | 0.021817 | 2.18 | 16 |
| 4 | 0.087266 | 8.7 | 65 |
| 6 | 0.19625 | 20 | 147 |
| 8 | 0.348888889 | 35 | 261 |
| 10 | 0.545415391 | 55 | 408 |
| 12 | 0.785 | 79 | 587 |
| 16 | 1.395555556 | 140 | 1,044 |
| 24 | 3.14 | 314 | 2,349 |
| 30 | 4.9087385 | 491 | 3,672 |
| 36 | 7.06858 | 707 | 5,288 |
| 42 | 9.621127502 | 962 | 7,196 |
| 48 | 12.56637061 | 1,257 | 9,400 |
| 54 | 15.90431281 | 1,590 | 11,894 |
| 66 | 23.7582944 | 2,376 | 17,772 |